

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MONTANA TECHNICAL GUIDE

SECTION IV

Pipeline (Ft)

Pipeline MT-516

Definition

Pipeline installed for conveying water for livestock or for recreation.

Scope

This standard applies to pipelines that have an inside diameter of less than 4 in. They are installed for livestock water or for recreation areas.

Purpose

To convey water from a source of supply to points of use.

Conditions Where Practice Applies

Where conveyance of water in a closed conduit is desirable or necessary to conduct water from one point to another, to conserve the supply, or for reasons of sanitation.

This practice also applies to sites where additional water is required to provide erosion control and/or to maintain or improve water quality.

Design Criteria

General. When used for conveyance of livestock water, this practice shall facilitate proper range use by improving distribution of grazing over all parts of the range, meeting the water requirements of livestock with adequately distributed water supplies.

Capacity. For supplying livestock water, the installation shall have a capacity to provide at least the gallons per head per day listed in Table 1.

For recreation areas, the installation shall be adequate for all planned uses of the water, such as drinking, fire protection, showers,

flush toilets, and irrigation of landscaped areas.

Sanitary protection. If water from the pipeline is likely to be used for human consumption, the requirements of the state health department for materials and installation must be met.

Pipe. Steel pipe shall meet the requirements specified in ASTM-A-120 or in AWWA Specification C-200. If because of local conditions, a coal-tar enamel protective coating is needed for steel pipe, the coating shall meet the requirements of AWWA Specification C-203. Plastic pressure pipe shall be suitable for underground use. The pipe shall conform to the requirements of the following ASTM specifications:

D 1785 Polyvinyl Chloride (PVC) Plastic Pipe, Schedule 40, 80, and 120
D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40
D 2241 Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR)
D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedule 40 and 80
D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
D 2239 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter
D 3035 Polyethylene (PE) Plastic Pipe (SDR-PR), Based on Controlled Outside Diameter
D 2447 Polyethylene (PE) Plastic Pipe, schedule 40 and 80, Based on Outside Diameter
D 2737 Polyethylene (PE) Plastic Tubing
D 2672 Bell-End Polyvinyl Chloride (PVC) Pipe
D 2740 Polyvinyl Chloride (PVC) Plastic Tubing

Note: This type of font (AaBbCcDdEeFfGg123..) indicates SCS National Standards

Table 1 MINIMUM DAILY STOCKWATER REQUIREMENTS, MONTANA

Livestock	Drinking Water Quant.		Maximum Water Spacing (miles)	
	Conventional Grazing System Gal/day	Intensive Grazing System Gal/day	Rough Relief	Gentle Relief
Range Cow	15	20	1/2	1
Cow & Small Calf	20	25	1/2	1
Horses & Mules	15	20	1/2	1
Sheep & Goats	2	4	1/2	1
Dairy Cow	25	30		
Hog	2			
Mule Deer	2		1	2
Antelope	2		2	3
Elk	8		1	3

Daily water consumption for livestock classes not listed may be calculated at one gallon per day per 100 lbs. of body weight.

D 2662 Polybutylene Water
Service Pipe
D 2666 Polybutylene Water
Service Pipe (Copper pipe size)

Pressure pipe fittings shall conform to the requirements of the following ASTM specifications:

D 2466 polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
D 2467 Socket-type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
D 2464 Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
D 2611 Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 80 (for IPS Pipe)
D 2610 Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 40 (for IPS Pipe)
D 3036 Socket-type Polyvinyl Chloride (PVC) Plastic Line Couplings
D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
D 2469 Socket-Type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80
D 2465 Threaded Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Threaded, Schedule 80
D2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings, for Polyethylene (PE) Plastic Pipe and Tubing
D 2683 Socket-type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

Solvents for solvent-welded pipe joints shall conform to the following ASTM specifications

D 2564 Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D 2855 Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM Specification F 477, Elastomeric Seals (Gaskets) for joining Plastic Pipe.

Pressure rating of pipe and appurtenances. Maximum pressure shall not exceed the pressure rating of pipe and appurtenances at any point in the pipeline. Pressure rating of plastic pipe and fittings shall be based on maximum anticipated water temperature.

Where pipeline velocities exceed 1.5 feet per second, and valve closure or frequent on/off cycling is possible, maximum system pressure shall not exceed 90 percent of the pipe's pressure rating or the design shall be based on a surge analysis.

Pipe protection. All exposed pipe shall be protected against mechanical and environmental hazards.

Water shall not be allowed to freeze in pipelines or appurtenances. Protection from freezing may be achieved by draining pipe and fittings during freezing conditions, insulating, burying below frost depth or heating.

Pipelines shall have at least 1-1/2 feet of cover unless shallower covering is specified for rocky areas or other local conditions. If shallower covering is specified, there shall be provision to protect the line from damage by livestock, vehicle traffic, excessive pipe movement and other hazards.

Steel pipe which is buried or laid on the ground shall undergo a corrosion analysis and a corrosion protection plan shall be developed and approved by the area or state engineer.

Pipe Size. Stockwater mainline shall be sized to accommodate potential future expansion of the system. Minimum pipe size shall be 1-1/4 inch nominal diameter unless justification for a smaller diameter is documented by an engineering analysis.

Overflow pipes shall be a minimum diameter of 1/2 inch larger than the delivery pipe, or 2 inch diameter, whichever is larger.

In areas where mineral or biological deposition in pipelines have proved to be a problem, the pipe shall be a minimum of 1/2 inch larger than otherwise required.

Pipeline Appurtenances. Pipeline design considerations shall include details for all needed air release valves, air-and-vacuum valves, pressure relief valves, pressure reducer valves, check valves, vents, drain valves, hydrants, surge chambers, pressure tanks, drains, access enclosures, water source hookups and other appurtenances.

Air valves--Portions of Pipeline Operating Pressures Greater than 10 psi. Pipelines where static or operating pressures exceed 10 psi shall have continuous acting air-release valves, or manually operated air vents at all significant high points in the line. A significant high point is defined as a high point in the pipeline more than 10 feet above an adjacent low point.

Automatic valves performing high volume air-and-vacuum release and continuous acting air-release functions shall be installed at the first summit of any height in the pipeline.

Except for the first air valve in the line, a manually operated air vent, such as a frost-free hydrant, may be used as an alternative to an automatic air valve. The operation and maintenance plan shall be specific concerning when and how to operate manual valves.

The need for vents or air-and-vacuum valves to exhaust large volumes of air during pipeline filling shall be evaluated on a case-by-case basis. This type of venting is usually needed at the end of pipelines and at major summits in the pipeline.

Air valves and vents--Portions of Pipeline Operating at 10 psi or less. Pipe shall be laid to grade such that all summits are well defined and can be vented. An open vent or continuous acting air-release valve shall be installed at all summits in the pipeline.

Air valves shall only be used where pressures are high enough at summits to operate a valve properly.

Drainage. Valves or unions shall be installed at low points in the pipeline so that the line can be drained if needed.

Where the pipeline is buried below probable frost depth (5 feet minimum), drains may be omitted.

Joints. Watertight joints that have a strength equal to that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

Vegetation. Disturbed areas shall be established to vegetation or otherwise stabilized as soon as practicable after construction. Seedbed preparation, seeding, fertilizing, and mulching shall conform to the instructions provided in technical guides.

Visual resources. The visual design of pipelines in areas of high public visibility and those in fragile areas shall be carefully considered.

Considerations

The effects of the following shall be considered during planning:

Water quantity considerations. Effects on the water budget, especially on volumes and rates of runoff and infiltration. Compare to centralized water facilities that has increased soil compaction because of traffic and livestock, vehicles and humans.

Effects on surface and ground water of broken pipelines.

Water quality considerations. The impact of water available at remote sites as a factor in keeping livestock out of streams and lakes, with the resulting reduction in bank erosion, sediment yield, and the direct deposit of manure in water courses.

Effects of bacteria, nutrients, salts, and organic matter on surface and groundwater because of increased recreation activity caused by the availability of water.

Effects of erosion and sediment yield from disturbed areas during construction.

Plans and Specifications

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Operation and Maintenance

An operation and maintenance plan shall be prepared for use by the owner or others responsible for operating and maintaining the system. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.